WHAT IS CLAIMED IS:

1. A single crystal spinel material, the material having a non-stoichiometric composition and having a transparency window represented by absorptivity over a wavelength range, the wavelength range extending from about 400 nm to about 800 nm, the transparency window being defined as the largest single absorptivity peak height along said wavelength range, the largest single peak height being not greater than 0.35 cm^{-1}.

2. The material of claim 1, wherein the wavelength range extends up to about 2000 nm.

3. The material of claim 1, wherein the wavelength range extends up to about 3000 nm.

4. The material of claim 1, wherein the wavelength range extends up to about 3500 nm.

5. The material of claim 1, wherein the wavelength range extends up to about 4000 nm.

6. The material of claim 1, wherein the height is not greater than about 0.30 cm^{-1}.

7. The material of claim 1, wherein the height is not greater than about 0.25 cm^{-1}.

8. The material of claim 1, wherein the height is not greater than about 0.20 cm^{-1}.

9. The material of claim 1, wherein the material consists essentially of a single spinel phase, with substantially no secondary phases.

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10. The material of claim 1, wherein the material has the general formula $aAD \cdot bE_2D_3$, wherein A is selected from the group consisting of Mg, Ca, Zn, Mn, Ba, Sr, Cd, Fe, and combinations thereof, E is selected from the group consisting Al, In, Cr, Sc, Lu, Fe, and combinations thereof, and D is selected from the group consisting O, S, Se, and combinations thereof, wherein a ratio b:a > 1:1 such that the material is rich in E_2D_3.

11. The material of claim 10, wherein A is Mg, D is O, and E is Al, such that the material has the formula $aMgO \cdot bAl_2O_3$, the material consisting essentially of $aMgO \cdot bAl_2O_3$.

12. The material of claim 11, wherein the ratio b:a is not less than about 1.2:1.

13. The material of claim 11, wherein the ratio b:a is not less than about 1.5:1.

14. The material of claim 11, wherein the ratio b:a is not less than about 2.0:1.

15. The material of claim 11, wherein the ratio b:a is not less than about 2.5:1.

16. The material of claim 11, wherein the ratio b:a is about 3:1.

17. The material of claim 11, wherein the ratio b:a is not greater than about 4:1.

18. The material of claim 11, wherein the material has a lower mechanical stress and strain compared to stoichiometric spinel.

19. The material of claim 1, wherein the material has a laser damage threshold of not less than about 3.00 GW/cm^2, at a wavelength of 1064 nm.

20. The material of claim 1, wherein the material has a laser damage threshold of not less than about 3.25 GW/cm^2, at a wavelength of 1064 nm.

21. The material of claim 1, wherein the material has a laser damage threshold of not less than about 3.50 GW/cm^2, at a wavelength of 1064 nm.

22. The material of claim 1, wherein the material is in the form of an optical window.

23. The material of claim 1, wherein the material is in the form of an optical mirror.

24. The material of claim 1, wherein the material is in the form of a light pipe.

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